Jet Reconstruction Efficiencies

Fixed Presentation

Removed Z pt > 10.0 GeV in Data
This cuts was not in the MC

James Heinmiller
Higgs Multi-Lepton Working Group Meeting

13OCT04

Samples

- Data:
  - EM1TRK skim
  - Single EM triggers
  - Run range: 20 April 2002 - 28 June 2004 (Runs 151,817 - 194,566)
  - Rejecting bad runs (CAL, SMT, CFT, Jet/Met, Lumi)
  - 323pb^{-1}
  - No t42 applied
  - Processed with ATHENA (v01-05-02)

- MC:
  - Z/Gamma* –> e^+e^- +X: 400k Pythia
  - Zj->eej: 150k Alp+Pythia
  - Zjj->eejj: 273k Alp+Pythia
  - Processed with ATHENA (v01-05-02)

Selection Criteria

- Removing bad runs/LBNs & dupli events
- PVX cut: |z|<60cm
- Using unprescaled single EM triggers
- Electron selection:
  - |ID|=10,11
  - EMF>0.9
  - Iso<0.15
  - HMx(7)<12
  - p_T>25GeV
  - Including phi cracks
- Z selection:
  - 80 GeV < M_{ee} < 100 GeV
  - two trackmatched electrons with opposite signs
  - At least one electron needs to fire the trigger
- Jet selection:
  - 0.05 < EMF < 0.95
  - HotF < 10
  - N90>1
  - CHF<0.4
  - L1conf
  - JES corrected p_T>15GeV
  - |η|<2.5
  - Removal of jets overlapping with electrons from Z within dR of 0.4

Plan – last time I talked 22JUL04 in general higgs meeting

Smear Monte Carlo Energy Resolution to match data

Repeat analysis and get a new scale factor

Bring Monte Carlo to Data using Z sample and the scale factor

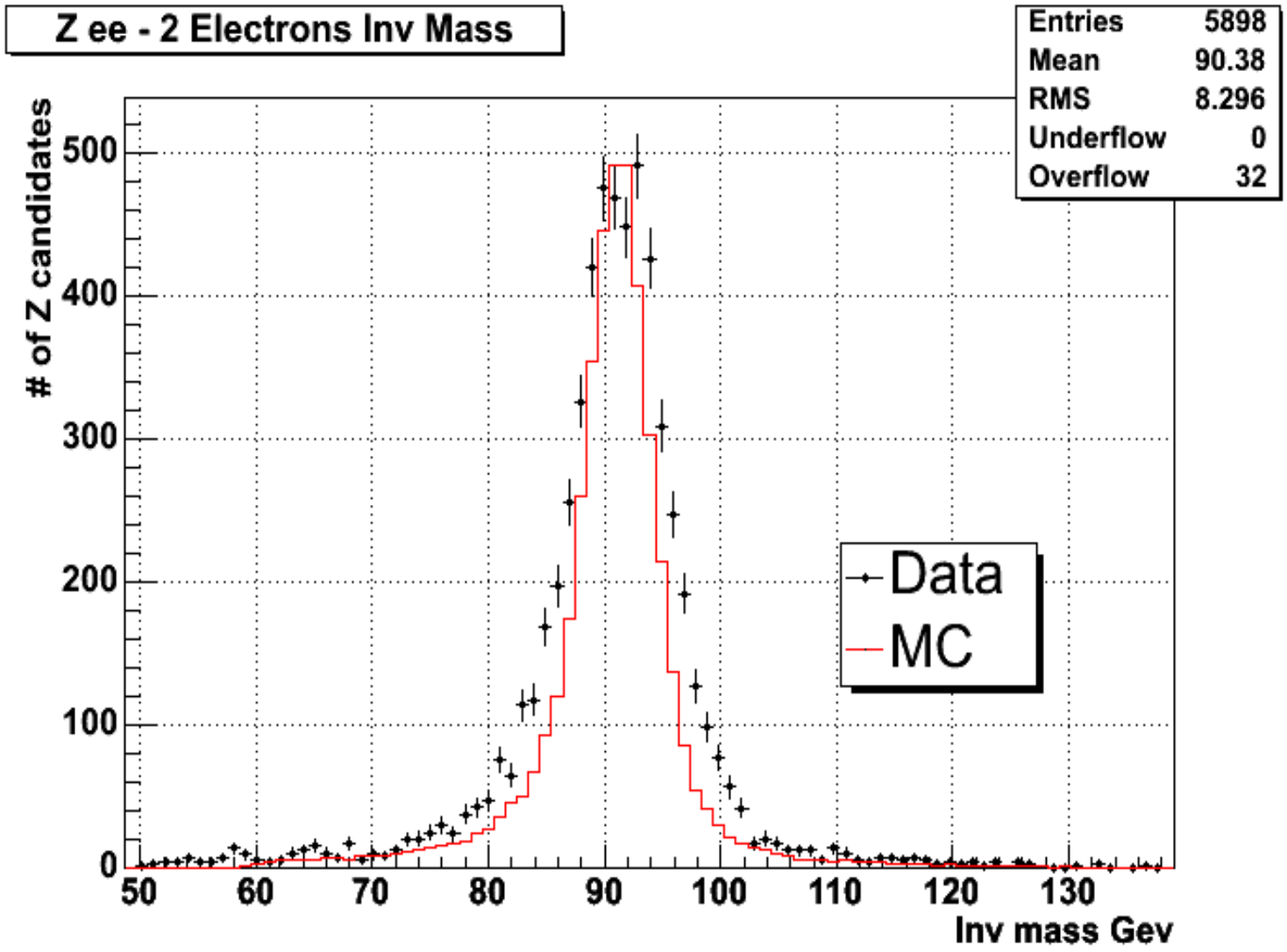
Use “fixed” Monte Carlo to determine straight efficiencies vs particle jet Et

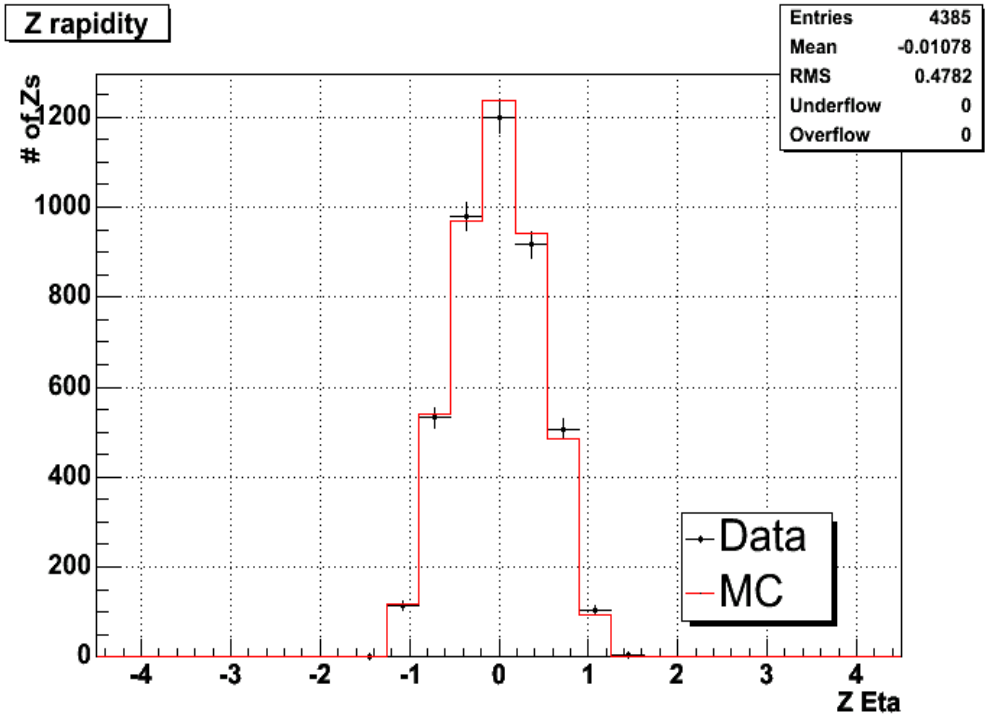
Use Calorimeter Jets vs Particle Jets Et Correlation to parameterize jet eff vs jet Et

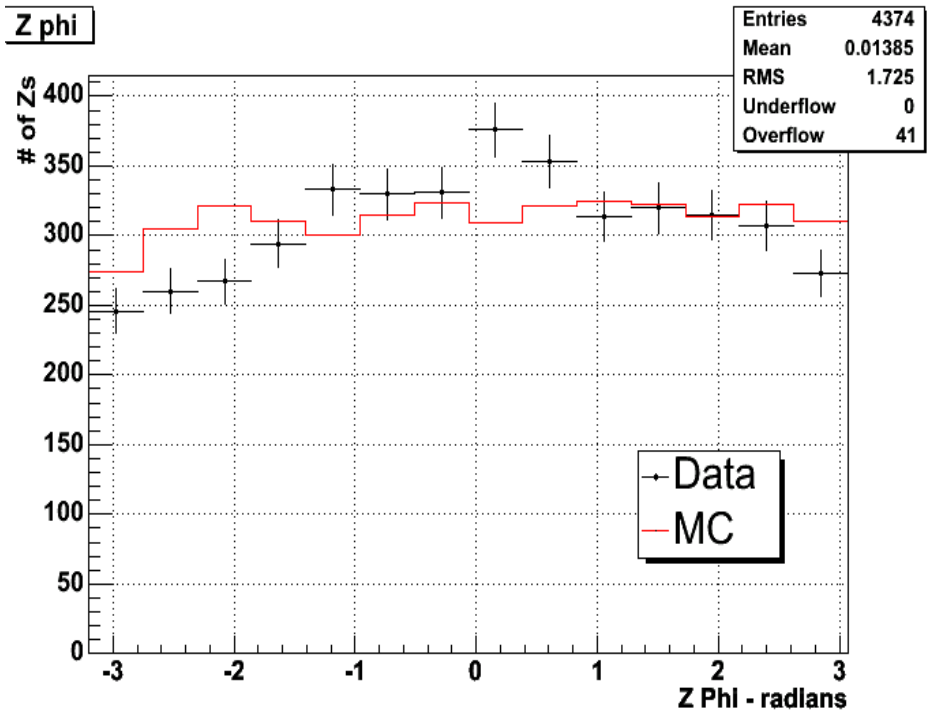
Estimate systematic uncertainties

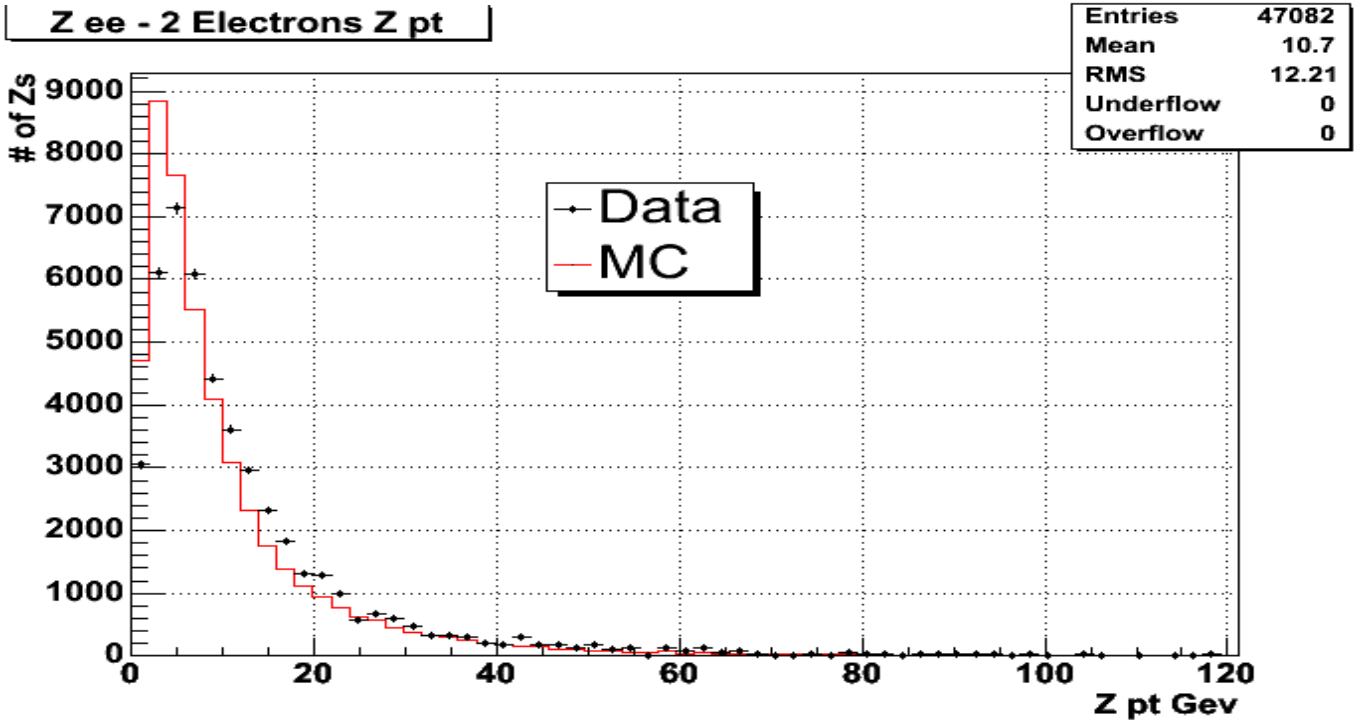
OUTLINE

electron distributions
jet distributions
jet eff. by Z pt
scale factor
straight MC eff
Straight Data Eff
Systematic Errors

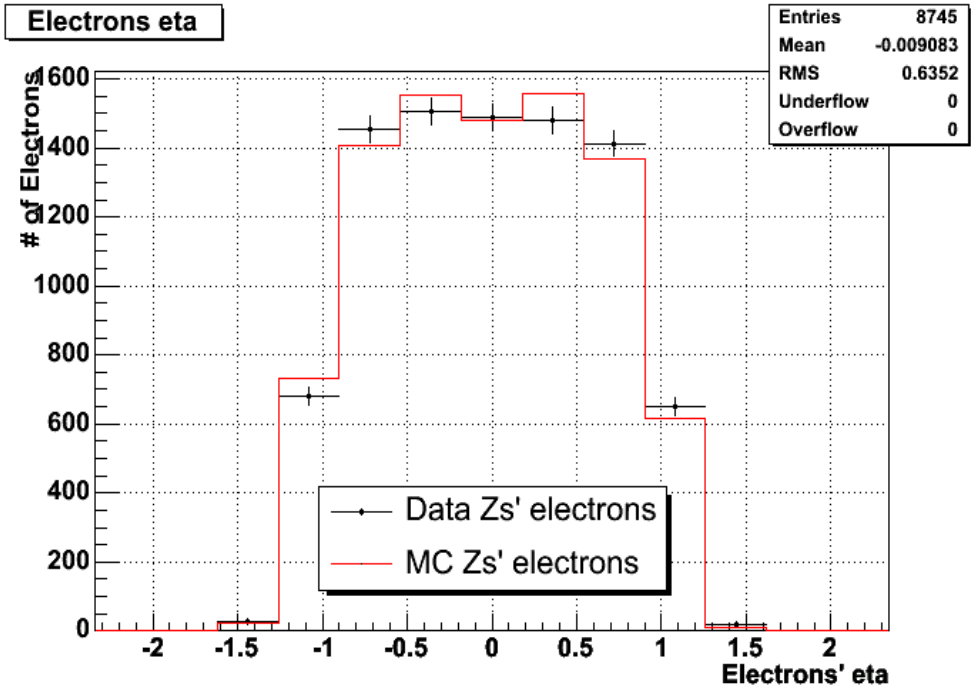

Z ee - 2 Electrons Inv Mass
Entries 5898
Mean 90.38
RMS 8.296
Underflow 0
Overflow 32
# of Z candidates
0
100
200
300
400
500
50
60
70
80
90
100
110
120
130
Inv mass Gev
Data
MC

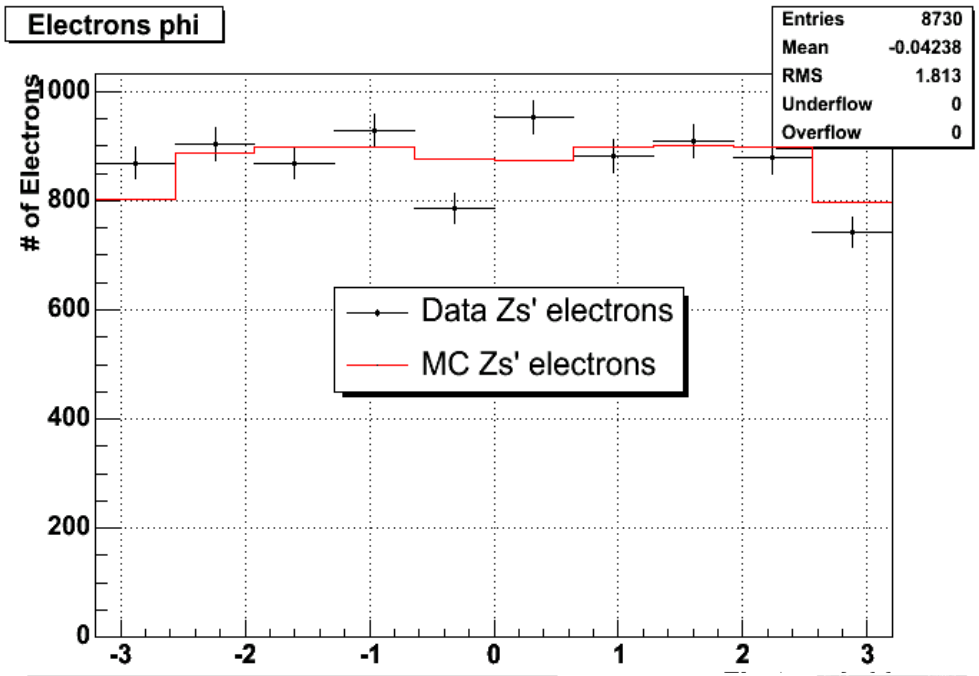

Z rapidity
Entries 4385
Mean -0.01078
RMS 0.4782
Underflow 0
Overflow 0
# of Zs
Z Eta
Data
MC

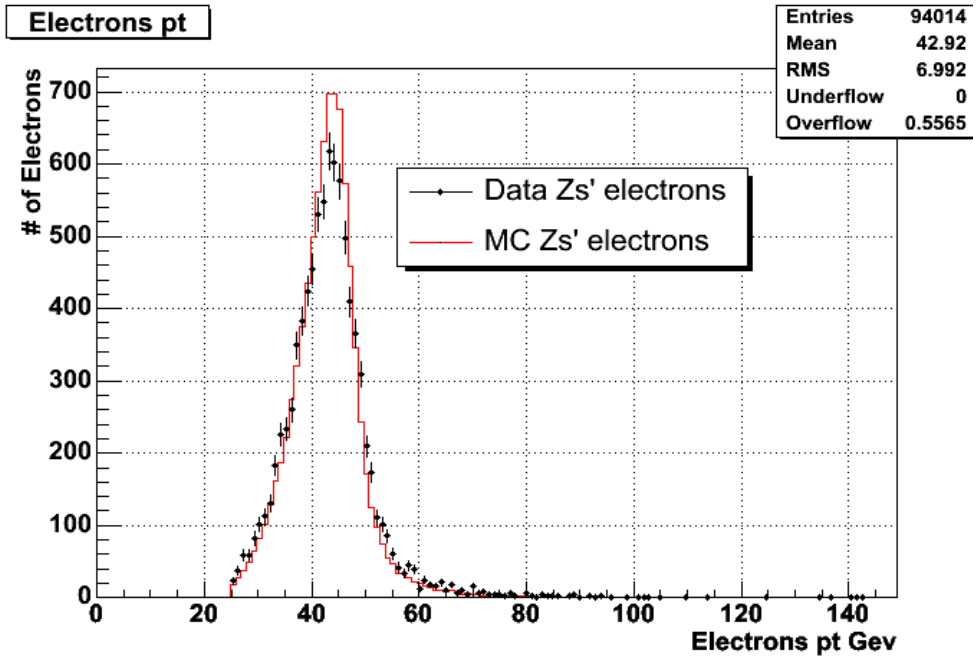

Z phi
Entries 4374
Mean 0.01385
RMS 1.725
Underflow 0
Overflow 41
# of Zs
Z Phi - radians
Data
MC

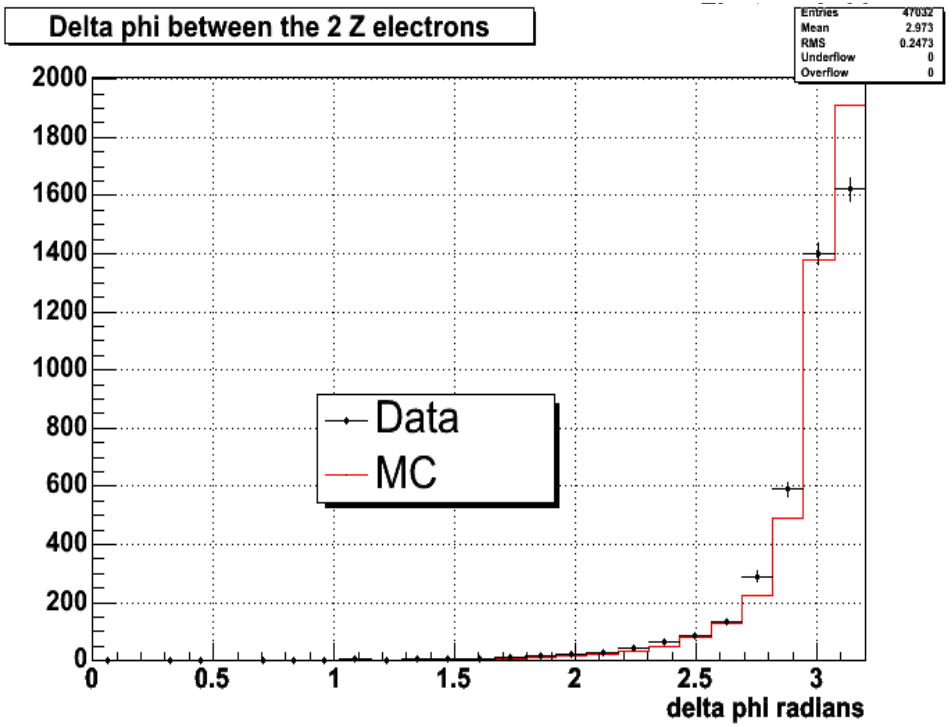

Z ee - 2 Electrons Z pt
Entries 47082
Mean 10.7
RMS 12.21
Underflow 0
Overflow 0
# of Zs
Z pt Gev
Data
MC

Both electrons inside the Z mass window

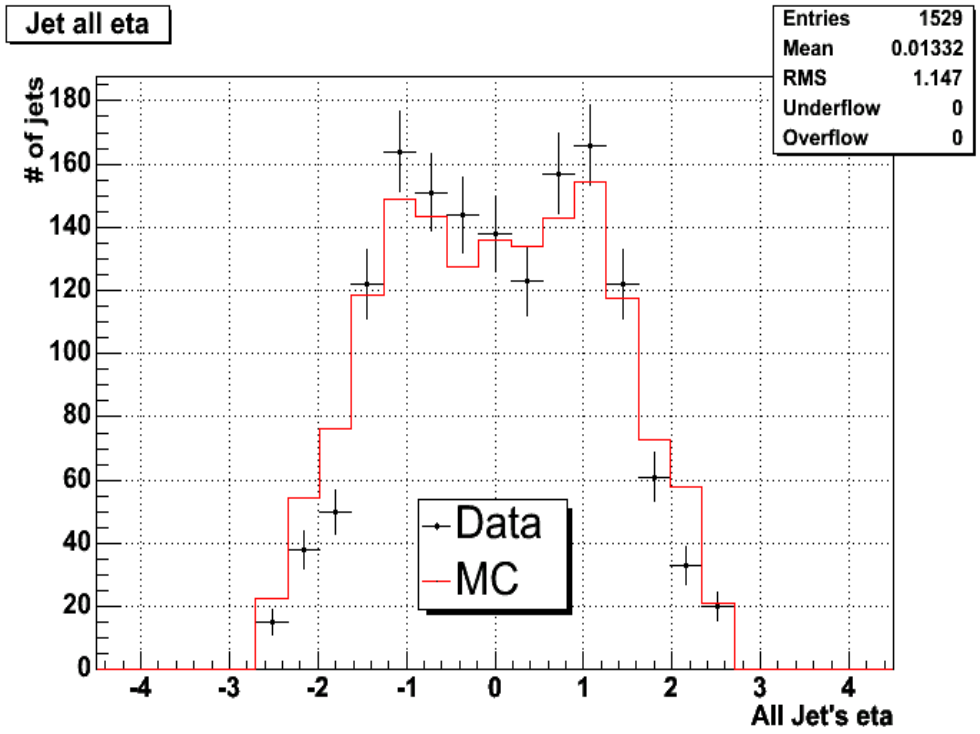


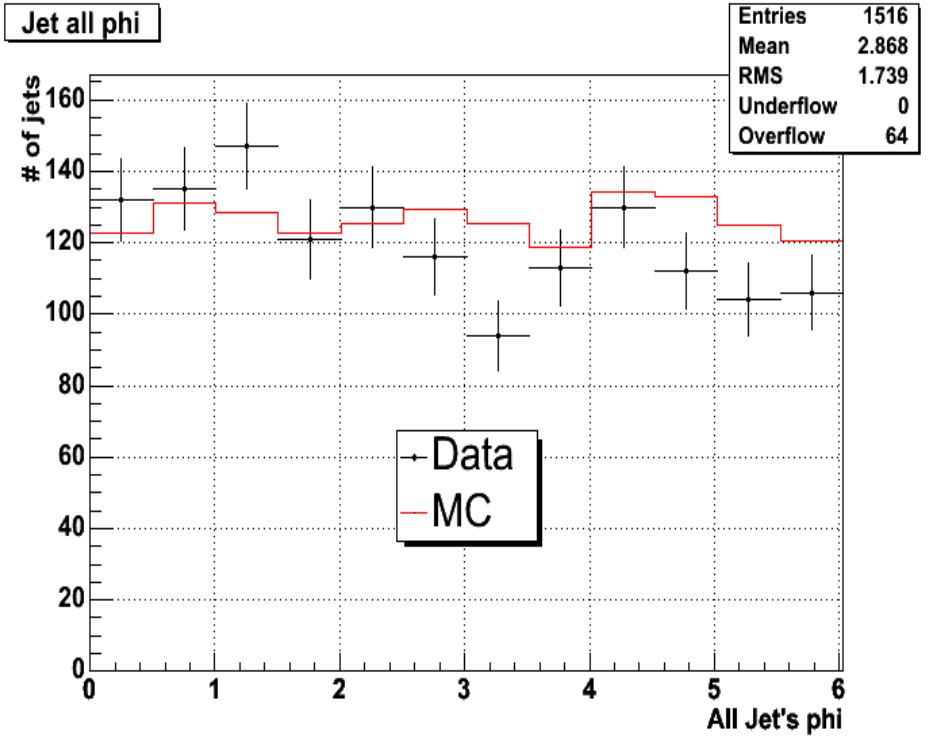


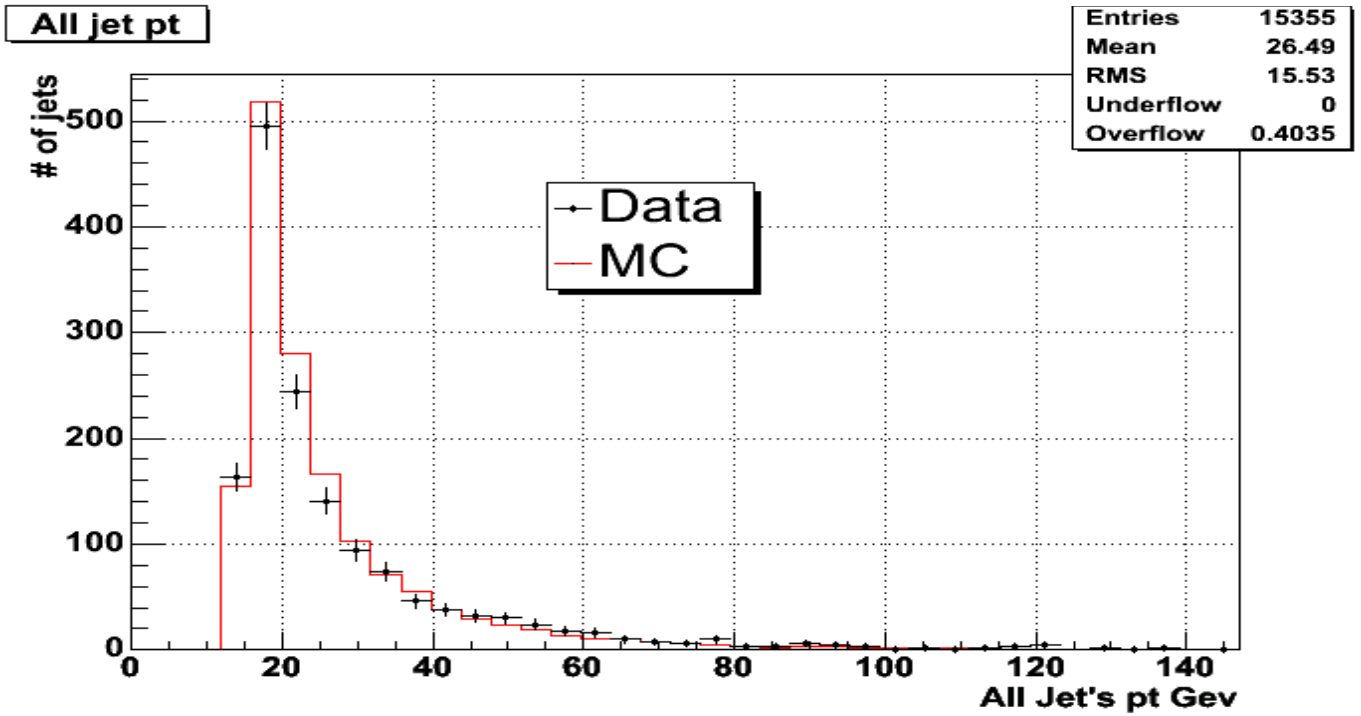


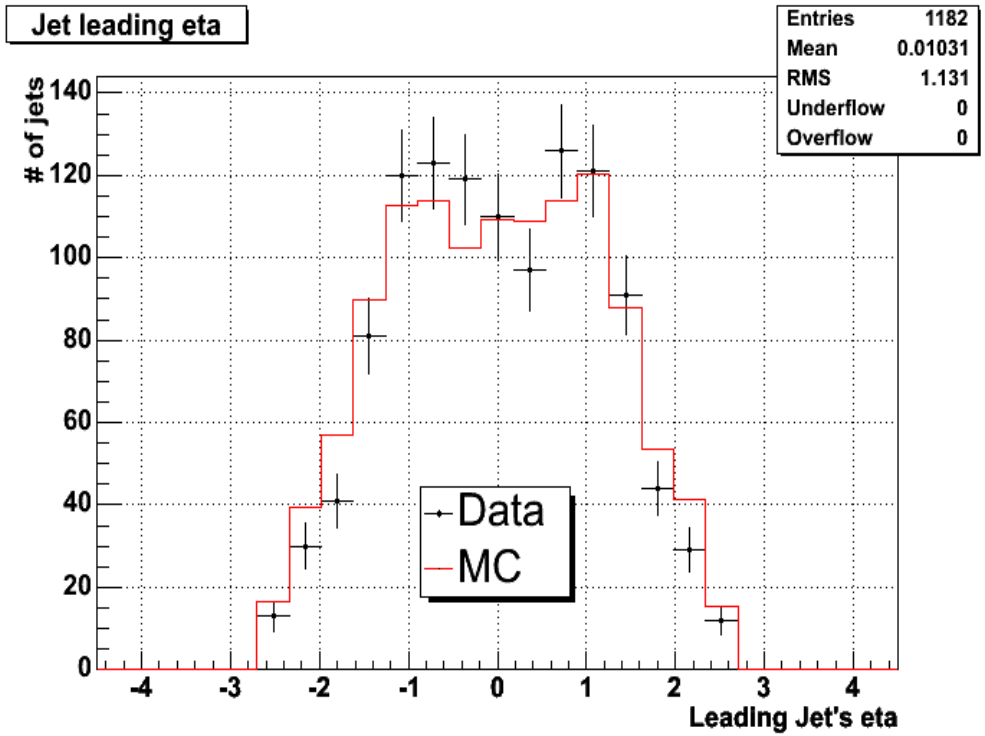


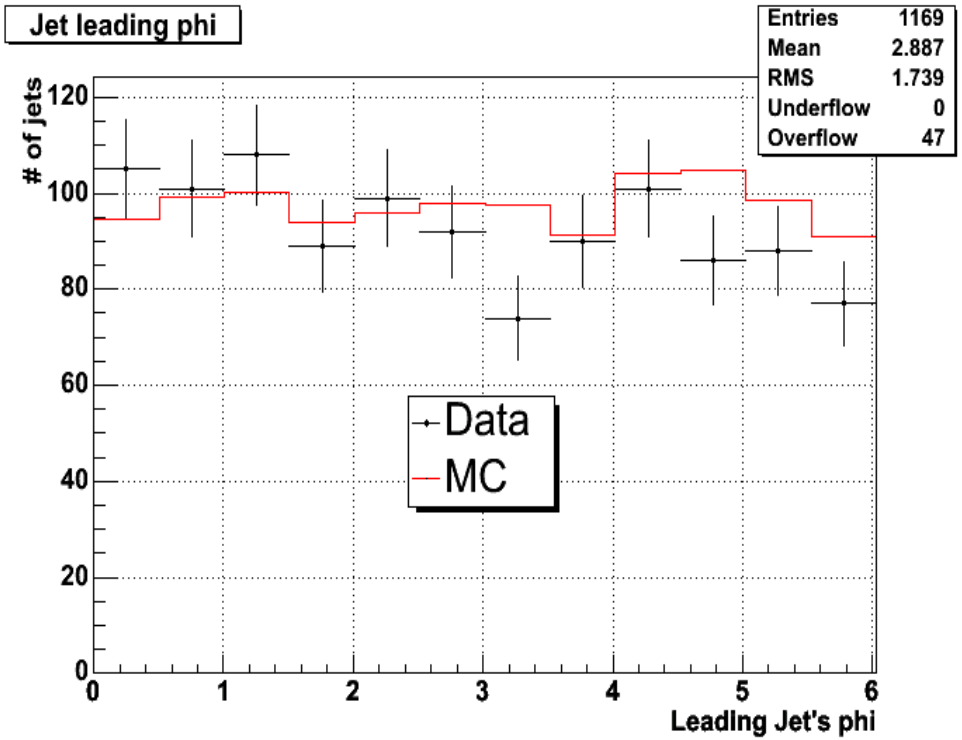
Jet Distributions

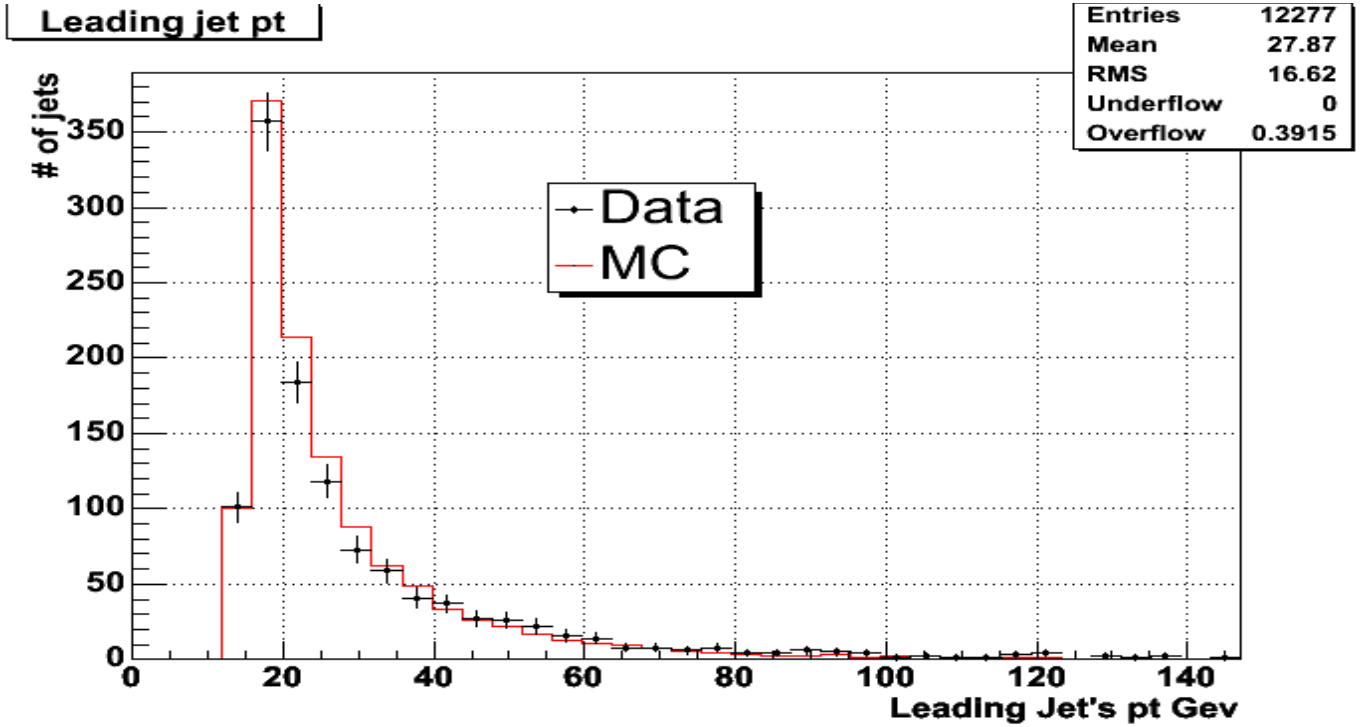

Jet all eta
Entries 1529
Mean 0.01332
RMS 1.147
Underflow 0
Overflow 0
# of jets
All Jet's eta
Data
MC


Jet all phi
Entries 1516
Mean 2.868
RMS 1.739
Underflow 0
Overflow 64
# of jets
All Jet's phi
Data
MC

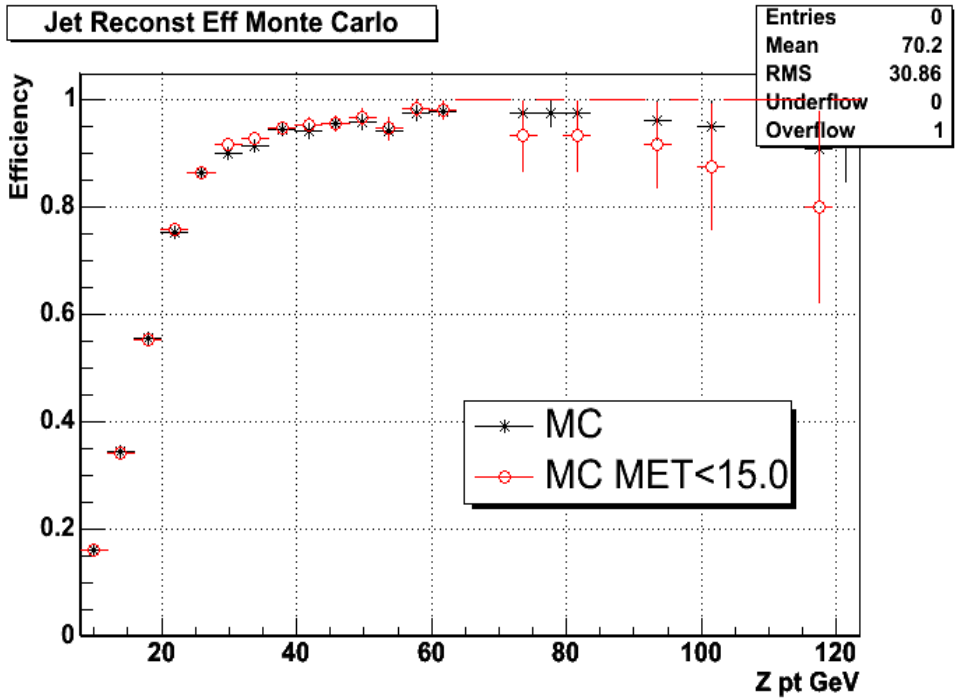

All jet pt
Entries 15355
Mean 26.49
RMS 15.53
Underflow 0
Overflow 0.4035
# of jets
All Jet's pt Gev
Data
MC

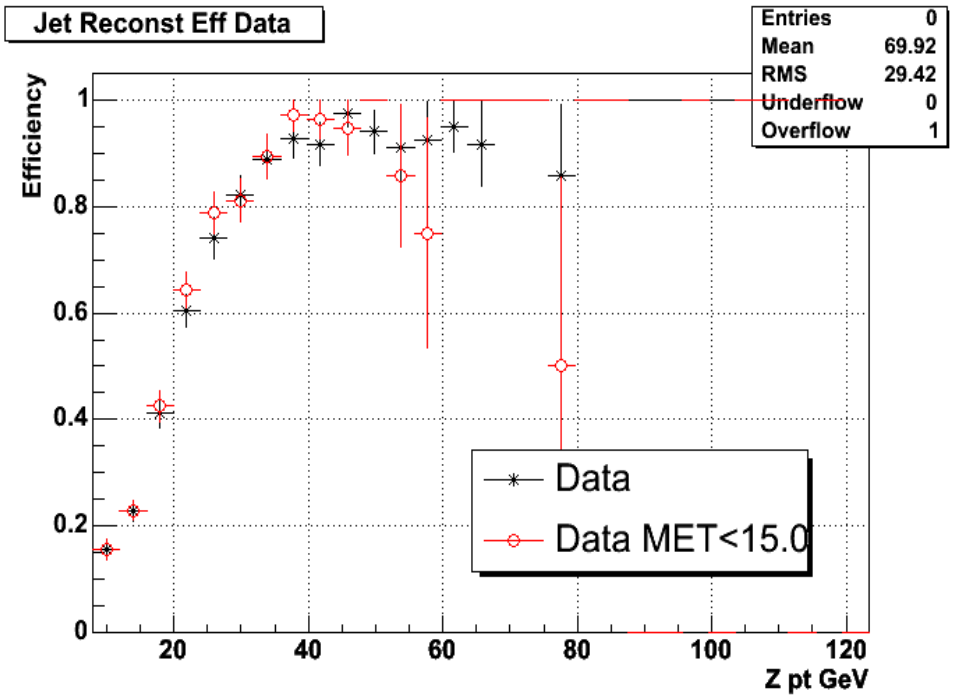

Jet leading eta
Entries 1182
Mean 0.01031
RMS 1.131
Underflow 0
Overflow 0
# of jets
Data
MC
Leading Jet's eta

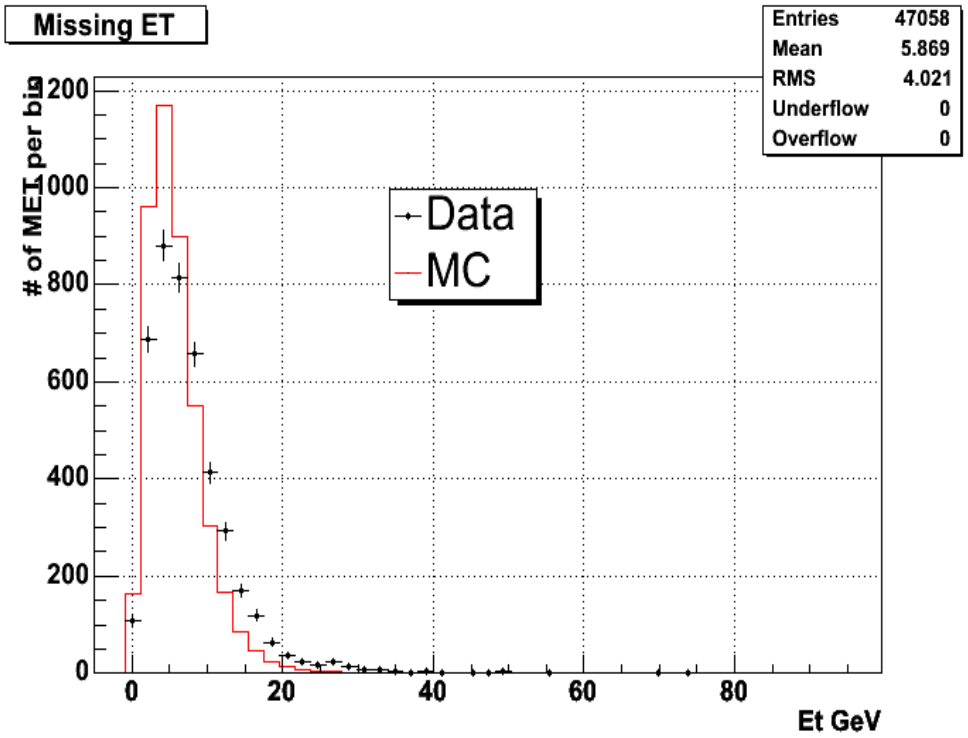

Jet leading phi
Entries 1169
Mean 2.887
RMS 1.739
Underflow 0
Overflow 47
# of jets
Data
MC
Leading Jet's phi

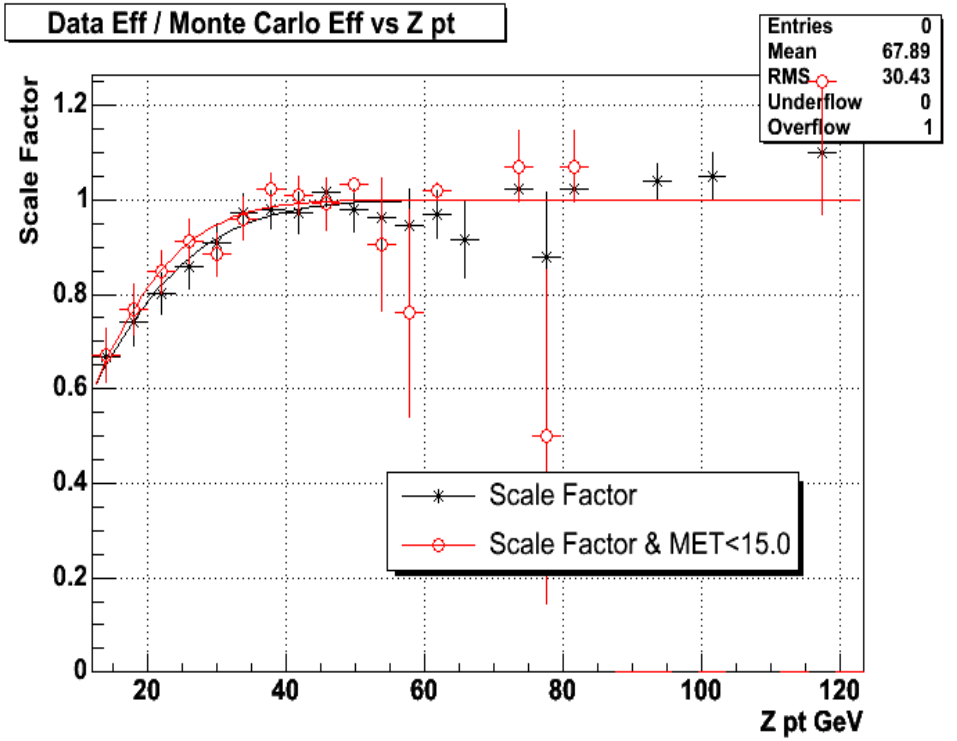

Leading jet pt
Entries 12277
Mean 27.87
RMS 16.62
Underflow 0
Overflow 0.3915
# of jets
Data
MC
Leading Jet's pt Gev

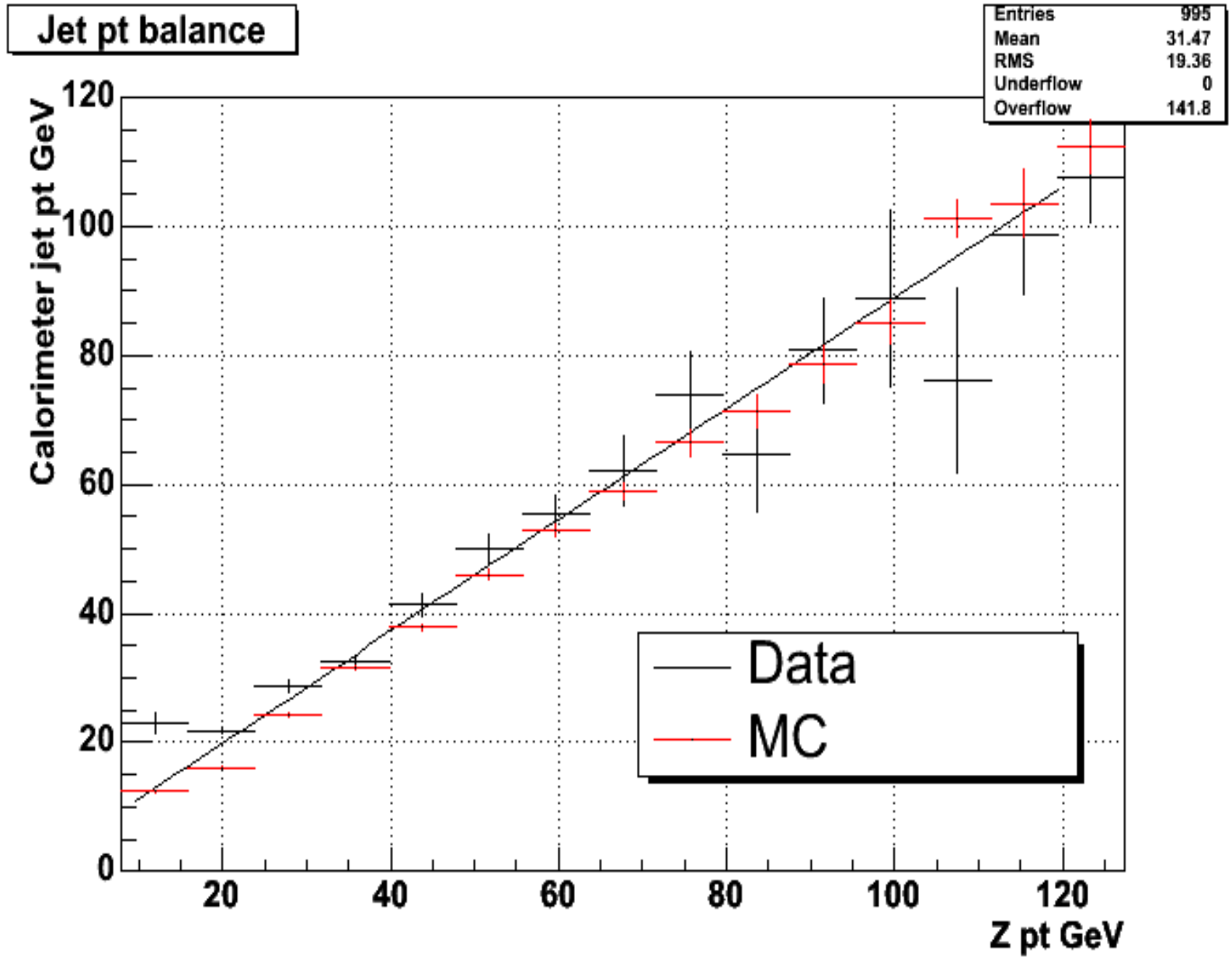
Efficiencies

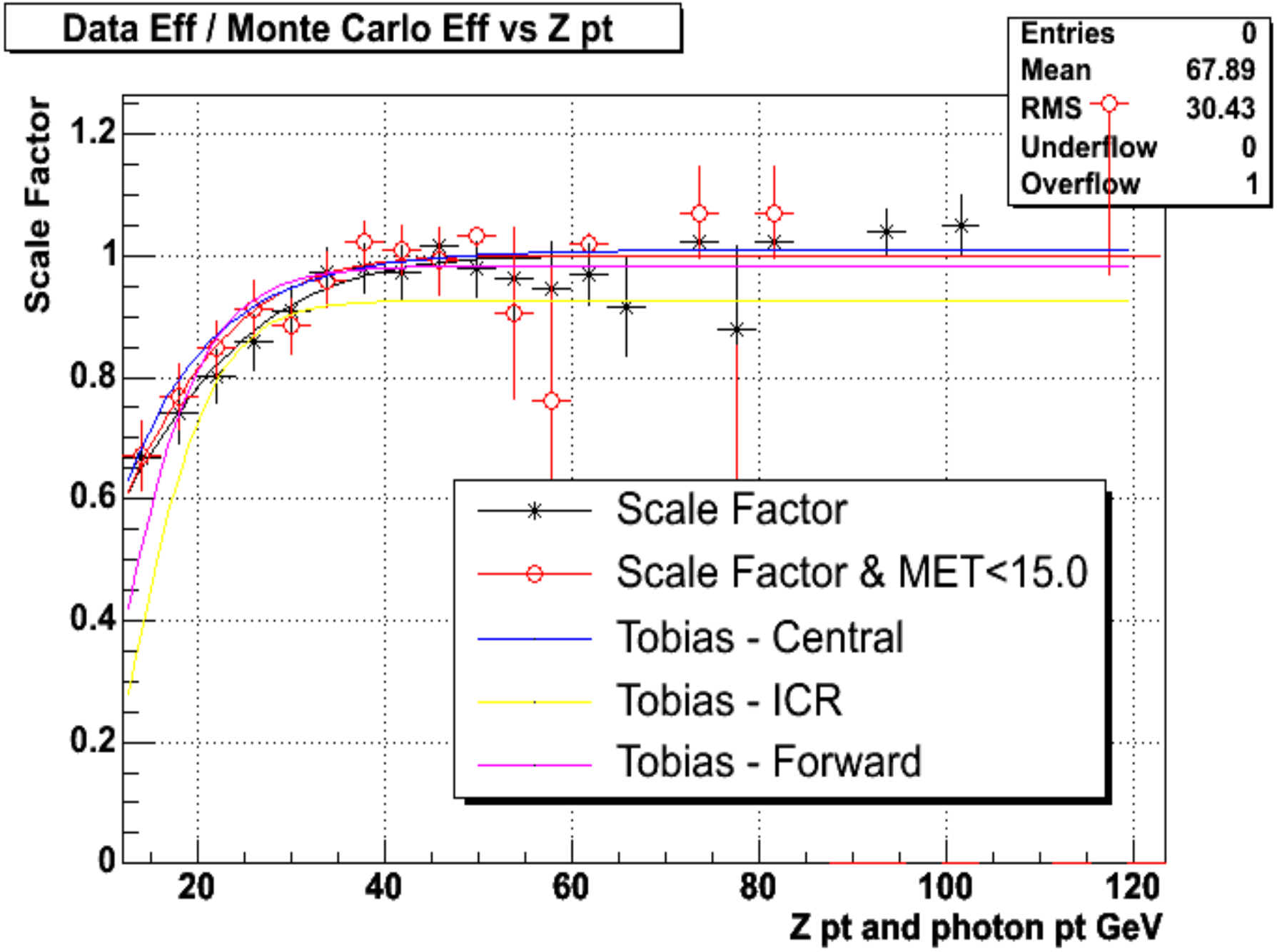

Jet Reconst Eff Monte Carlo
Entries 0
Mean 70.2
RMS 30.86
Underflow 0
Overflow 1
Efficiency
Z pt GeV
MC
MC MET<15.0


Jet Reconst Eff Data
Entries 0
Mean 69.92
RMS 29.42
Underflow 0
Overflow 1
Efficiency
Z pt GeV
Data
Data MET<15.0

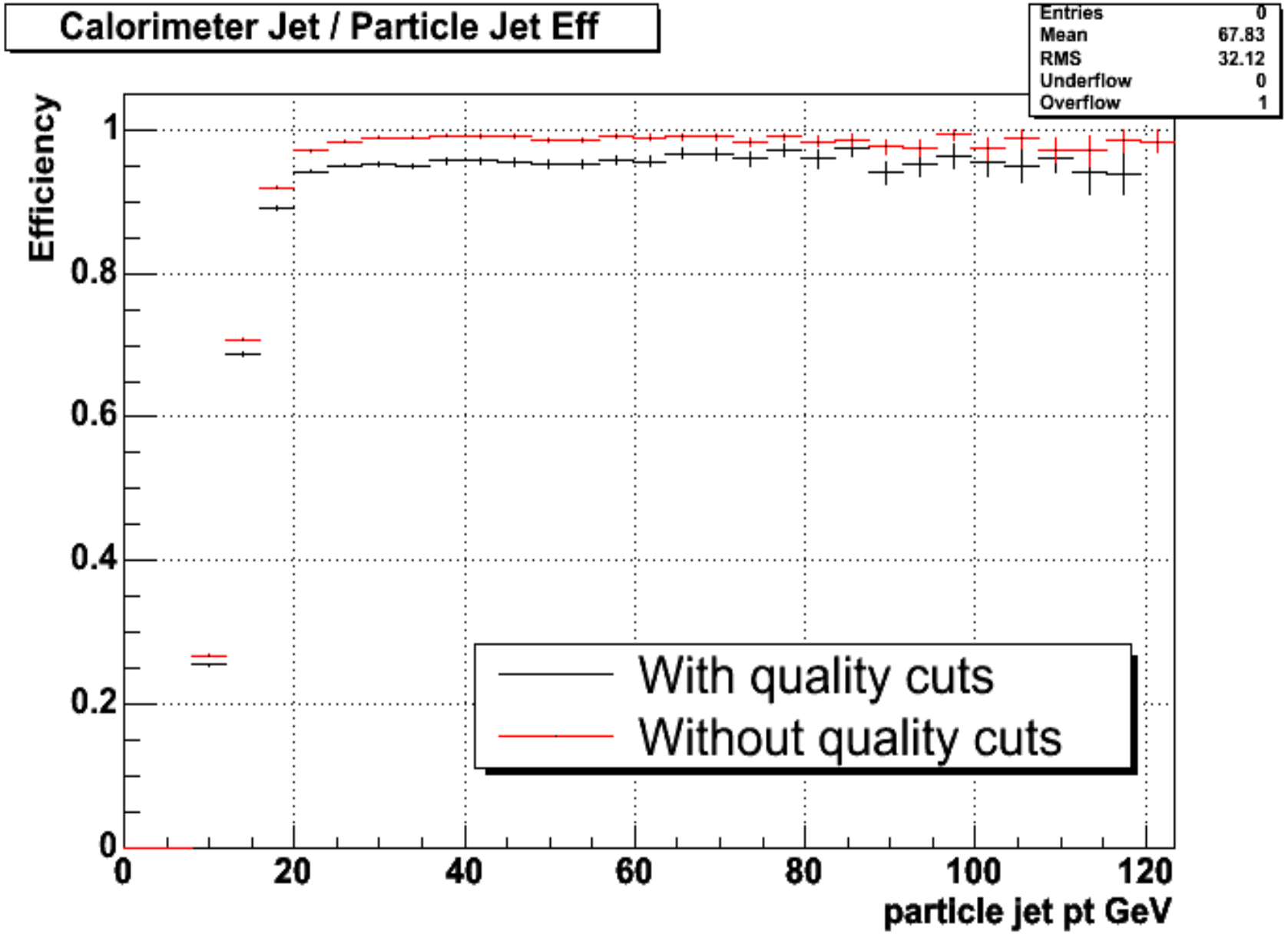

Missing ET
Entries 47058
Mean 5.869
RMS 4.021
Underflow 0
Overflow 0
# of MET per bin
Et GeV
Data
MC


Data Eff / Monte Carlo Eff vs Z pt
Entries 0
Mean 67.89
RMS 30.43
Underflow 0
Overflow 1
Scale Factor
Z pt GeV
Scale Factor
Scale Factor & MET<15.0

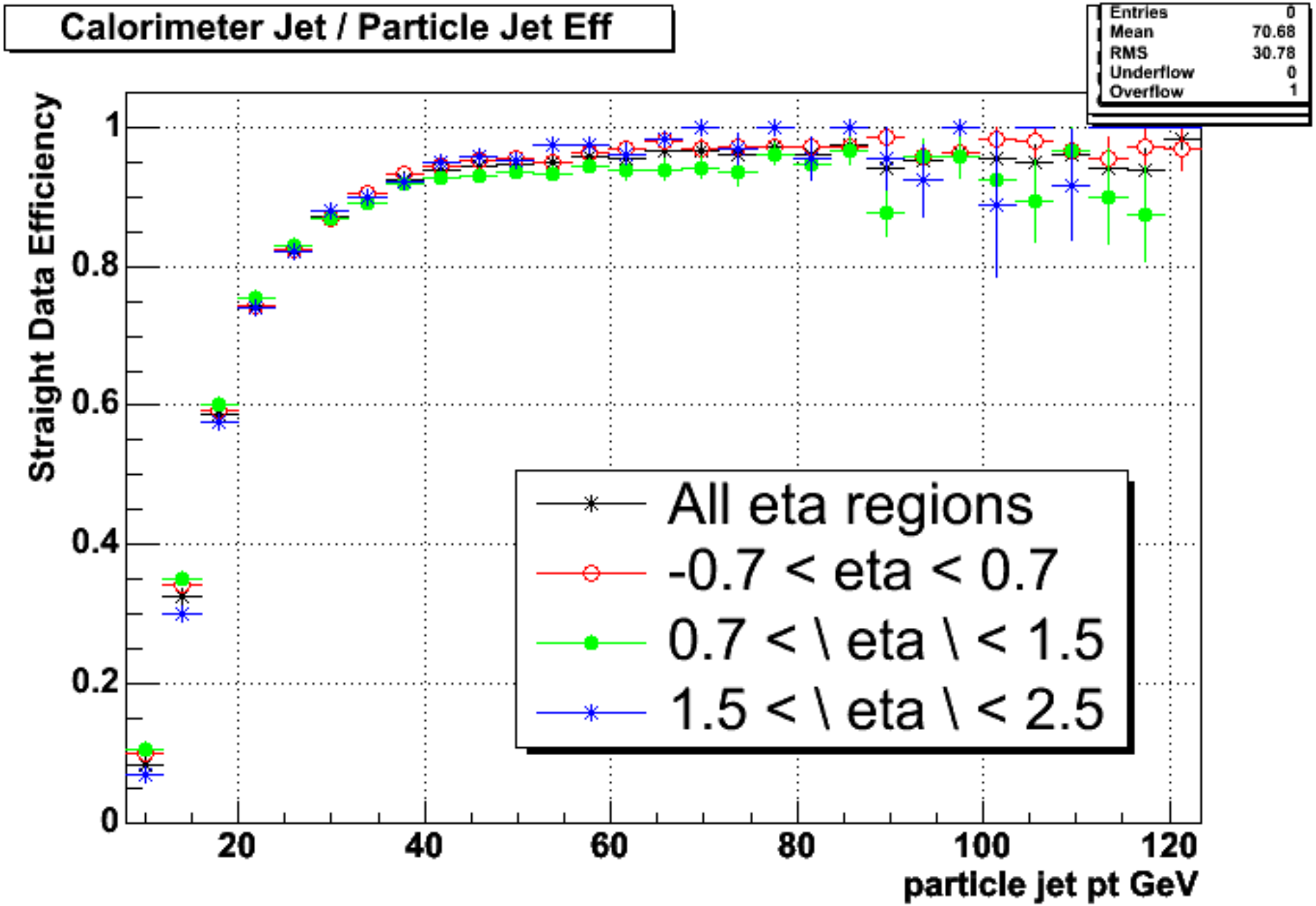

Jet pt balance
Entries 995
Mean 31.47
RMS 19.36
Underflow 0
Overflow 141.8
Calorimeter jet pt GeV
Z pt GeV
Data
MC
0
20
40
60
80
100
120


Data Eff / Monte Carlo Eff vs Z pt
Entries 0
Mean 67.89
RMS 30.43
Underflow 0
Overflow 1
Scale Factor
1.2
1
0.8
0.6
0.4
0.2
0
20
40
60
80
100
120
Z pt and photon pt GeV
Scale Factor
Scale Factor & MET<15.0
Tobias - Central
Tobias - ICR
Tobias - Forward

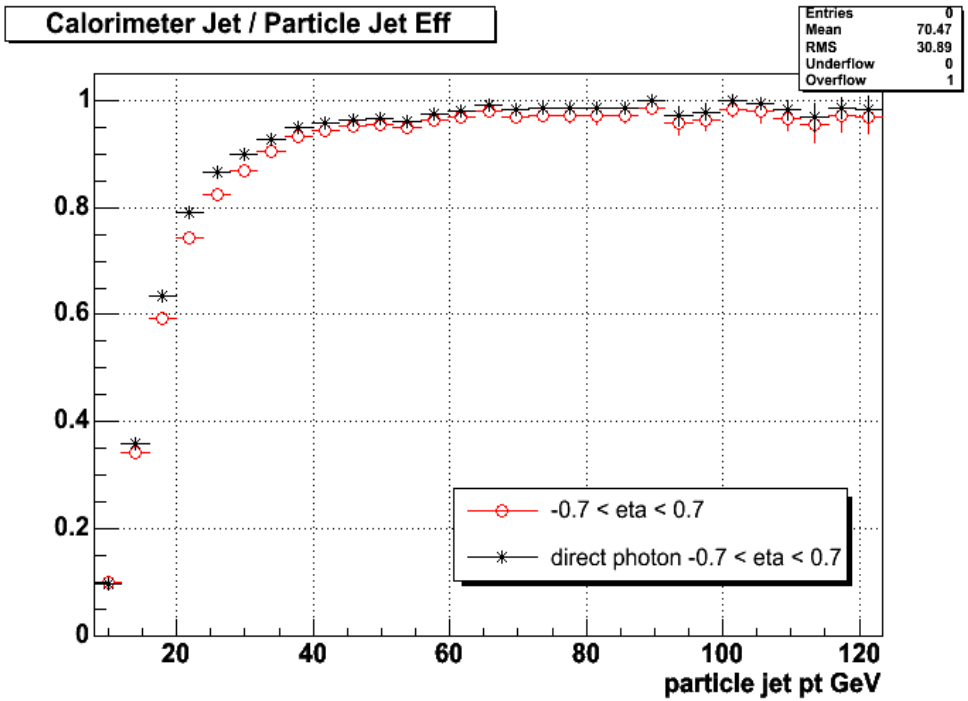
Monte Carlo Straight Efficiencies

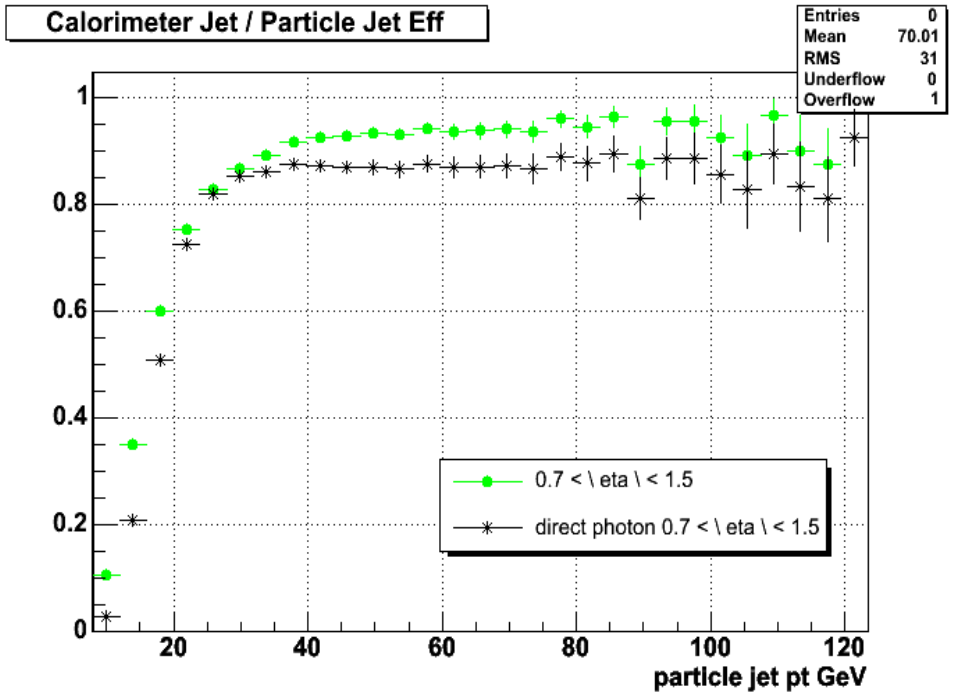


Straight Data efficiencies generated by appling the scale factor to MC

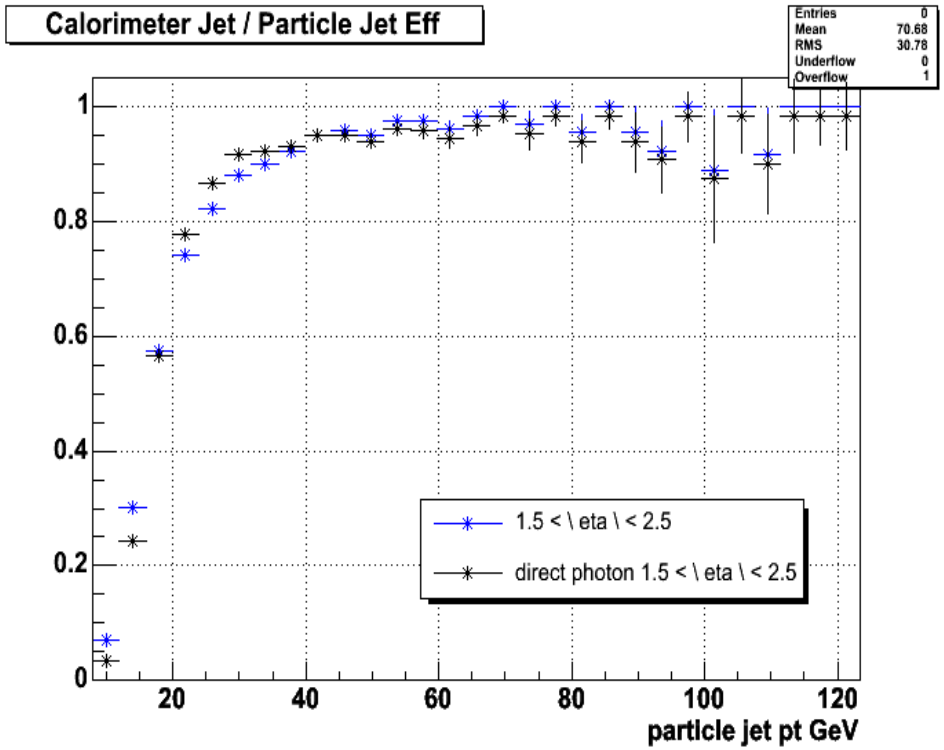


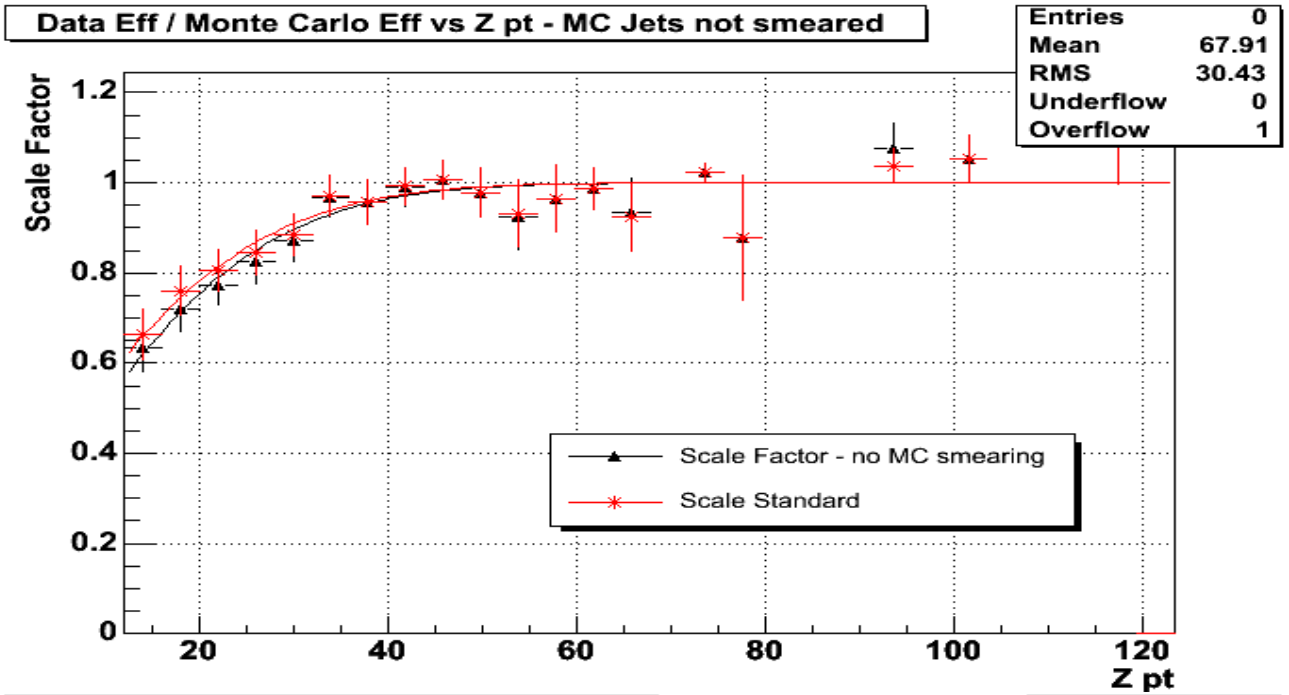
Error bars for this straight data efficiency curve

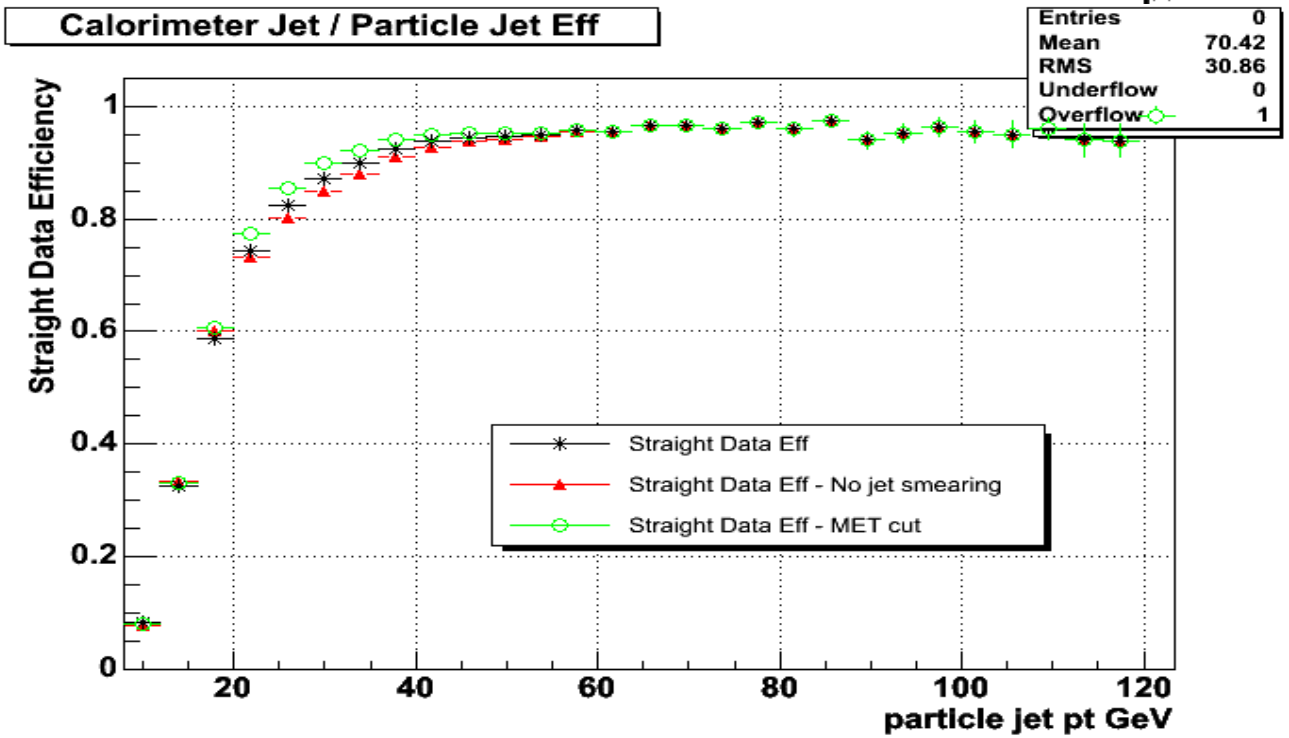


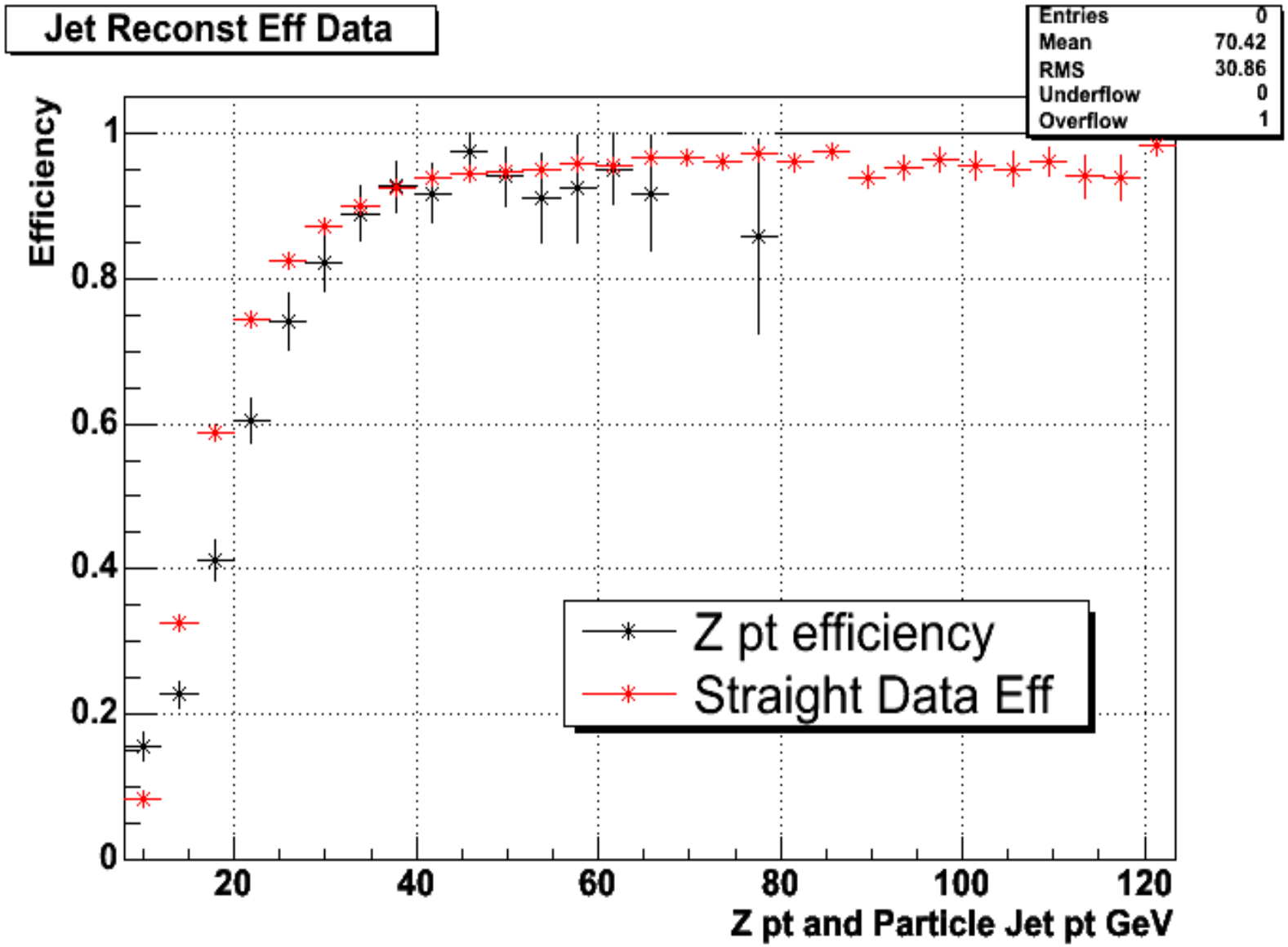


Straight
Efficiencies
central
icr
fwd




Data Eff / Monte Carlo Eff vs Z pt - MC Jets not smeared
Entries 0
Mean 67.91
RMS 30.43
Underflow 0
Overflow 1
Scale Factor
1.2
1
0.8
0.6
0.4
0.2
0
20
40
60
80
100
120
Z pt
Scale Factor - no MC smearing
Scale Standard

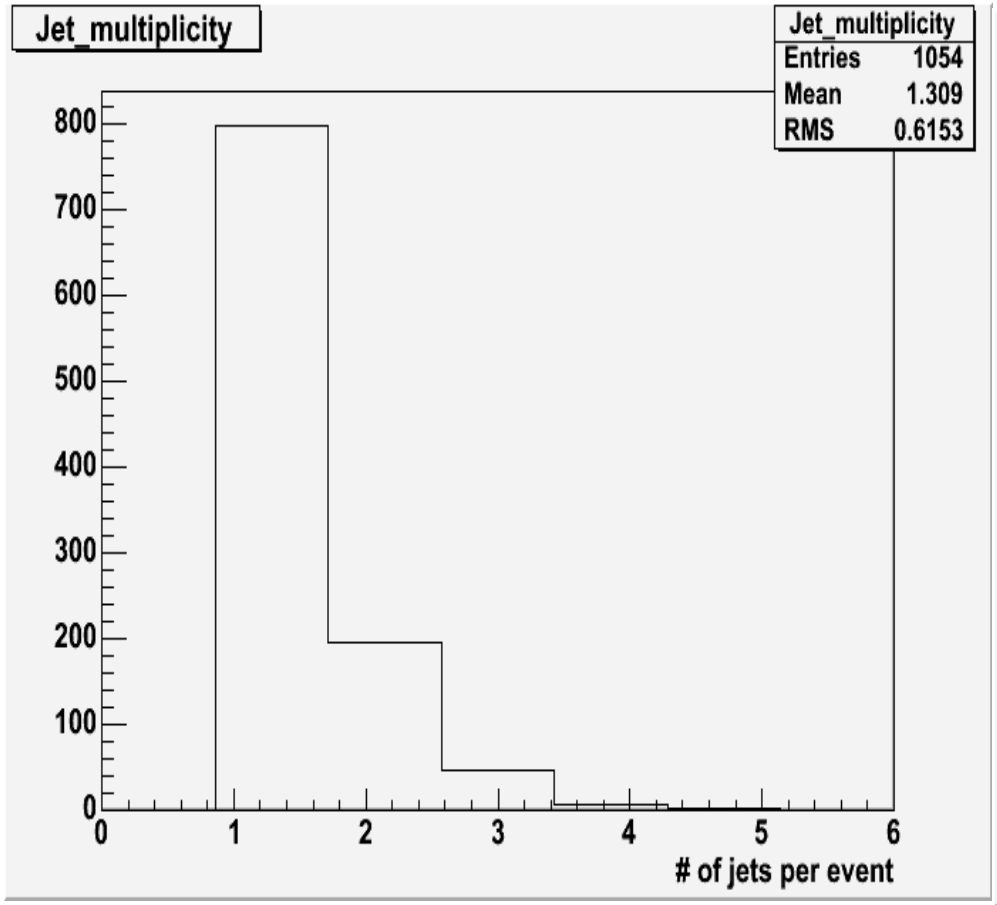

Calorimeter Jet / Particle Jet Eff
Entries 0
Mean 70.42
RMS 30.86
Underflow 0
Overflow 1
Straight Data Efficiency
1
0.8
0.6
0.4
0.2
0
20
40
60
80
100
120
particle jet pt GeV
Straight Data Eff
Straight Data Eff - No jet smearing
Straight Data Eff - MET cut

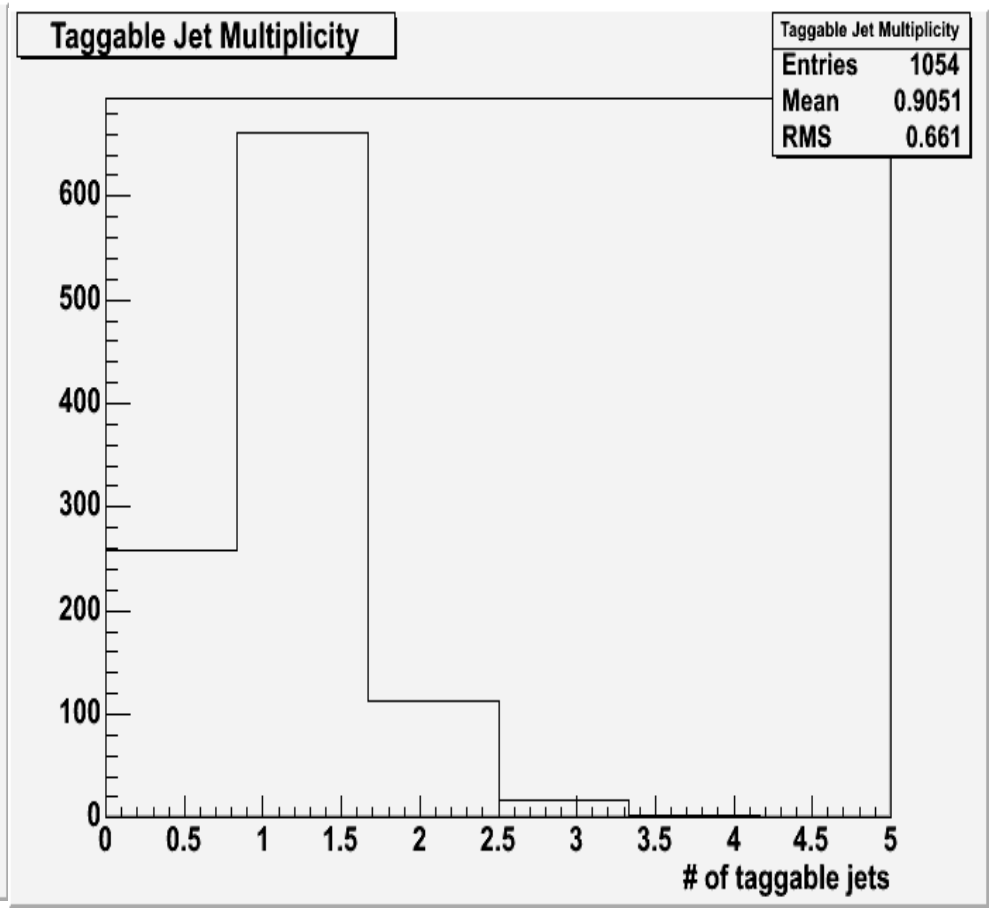

Jet Reconst Eff Data
Entries 0
Mean 70.42
RMS 30.86
Underflow 0
Overflow 1
Efficiency
1
0.8
0.6
0.4
0.2
0
20
40
60
80
100
120
Z pt and Particle Jet pt GeV
Z pt efficiency
Straight Data Eff

Conclusion for Jet Reconstruction Efficiencies

extract out an error for the straight efficiencies
write the note

Some B tagging information





2191 Events Passing my Z inv mass cut

954 Taggable Jets

	Loose	Medium	Tight
jlip	24	18	12
sv	10	8	8
mu	751	748	748